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ABSTRACT

In this paper, the authors report on a project designed to enhance an educational system's capability for introducing and regenerating change and tc develop and evaluate one specific strategy for implementing "second generation" planned change. The operation model views teachers as the key variable in the introduction cf planned change. Their commitment to change, it is claimed, comes about when teachers are given responsibility for making decisicns about the change in areas where their professional expertise is dominant. Some findings of the project to date indicate that the rate of adoption of the innovation is slower than was originally planned, that the task of communicating the intent of the project to teachers has been underestimated, and that substantially more investment will be needed in directly training teachers to use the innovation effectively. (Authors/WM)

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THE DEVELOPMENT AND EVALUATION OF ONE STRATEGY FOR IMPLEMENTING CHANGE IN SCHOOLS

by

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The Development and Evaluation of One Strategy For Implementing Change In Schools

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This project focuses on all 45 schools in Peterborough County and has 2 major purposes. One purpose is to enhance the system's capability for introducing and regenerating change. This is to be achieved through the process of developing, diffusing and evaluating a K to 10 mathematics program in the County (Interim Progress Report, June 1972). A second purpose of the project is to develop and evaluate one specific strategy for implementing second generation planned change in a county that may have important implications for change activities in other counties or similar systems. Results of this strategy will also further the evaluation of a general change model (Leithwood and Russell, in press) used in the development of the specific strategy reported here. The activities associated with the above 2 purposes can be categorized as development activities and applied research activities respectively. The applied research component of this project (development and evaluation of a change strategy) is designed to test the following general hypothesis: Given a favorable climate and suitable capability for change, developed gradually through change initiatives taken by a subsample of principals and teachers a strategy can be devised that will result in subsequent changes occuring more rapidly, more efficiently, on a broader base and with adequate integrity.

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1. Trent Valley Centre, R. R. No. 3, Peterborough, Ontario.

Essential features of the change model incorporated into this specific strategy are briefly elaborated as the project is described. One feature does merit attention at the outset, however. Teachers are viewed as the key variable in the introduction of school change. Their commitment to the change is critical if classroom implementation is to occur in a way that preserves the integrity of the proposed change. Such commitment comes about when teachers are given responsibility for making decisions about the change in areas where their professional expertise is dominant. In many instances this includes determining whether the needs of their children and the intended outcomes of the change are compatible. The relatively high degree of complexity of educational innovations, in comparison with innovations in agriculture, for example, often make this decision difficult. Although there are other alternatives, increased understanding of innovations and often, as a result, increased commitment to and adoption of changes comes about when teachers are also involved in some appropriate portion of the development of the innovation.

At the same time, senior school administrators are in an advantageous position to recognize discrepancies between societal goals for education reflected in the county and province and the outcomes of the county education system as a whole. In such a context the issue of accountability needs to be refined in such a way that identification of basic responsibilities results in organizational harmony rather than conflict. This is an extremely delicate task, operationally. The senior school administrator is accountable to the Ministry[2] and the county taxpayer for

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[2] The Ministry of Education is the governmental agency responsible for education in Ontario. Education is a provincial responsibility in Canada.

system outcomes; the principal is accountable to the senior school administrator and the local community for school outcomes; the teacher is accountable to the senior school administrator, the principal and the parent for individual student outcomes. As accountability shifts from administration to teacher, responsibilities with respect to educational goals should change toward becoming more operational, rather than fundamentally different.

Failure on the part of either the administrator or teacher to recognize these role responsibilities may be one important cause or many unsuccessful past and current attempts at educational change. The disequilibrium created by the administrator's suggestion of broad directions for change and the assumption of a facilitator's stance appear, in many instances, to be more functional than a directive stance. When administrative facilitation includes realistic but essential system reorganization and resource allocation then it becomes the teachers' responsibility for operationalizing the broad directions for change. This is not to suggest that broad educational goals cannot be set profitably at the teacher level, creating upward pressures for change. But this project deals with change clearly initiated at the county senior administrative level.

The Context of Change in Peterborough County

The change strategy developed in this Project is referred to as "second generation" primarily because of the earlier (and still ongoing) POISE Project activities (Benson, et al, 1969; Russell, Leithwood and Baxter, 1971). A climate for change and skills required for program change, particularly, were developed in varying degrees by principals and staffs originally in 5 schools and later in a total of 18 schools. Given this core of favorable

climate and background expertise, evolving slowly over a 4 year period, it seemed legitimate to capitalize on it when further needed changes were identified. Questions at the heart of this Project are: Do all well implemented county educational changes have to occur as slowly as those which occurred in POISE once that change process has been experienced by a significant minority of the education system? Can methods be found for stimulating meaningful change in those who will not consider it under "grass roots" conditions? Are there compromises between "top-down" and "grass roots" methods of implementing change acceptable under conditions of wide variation with respect to the degree of innovativeness present?

The stimulus for the specific subject matter change focused on in this Project can be traced back to the disenchantment, reported by the Peterborough summer school staff in 1971, with the basic language and number skills of their students. This report received public attention and, in concert with a social milieu of educational accountability resulted in the County Director of Education identifying those basic skill areas as requiring evaluation. A sub-committee of the Principals' Association, established to study the recommendation, suggested broad guidelines for meeting this evaluation need and charged the Principals' Professional Development Committee (PPDC) with the task of operationalizing the broad guidelines. (Both above committees requested and received an addition to their committees of a Trent Valley Centre staff member.) It is highly significant to the direction taken by the Project that a majority of members of both these committees had also participated in the POISE Project and were thoroughly familiar with the problems and needs of change at the school level. Project planning was done by the PPDC which, for the purposes of the Project, consisted of 1 secondary school principal, 3 elementary school principals,

1 secondary math head, the county math consultant, 1 superintendent and 1 member of the Trent Valley Centre. The Project was initially conceptualized as a series of workshops on evaluation, curriculum development and staff relations. However, it soon expanded into the 5 phased plan described in the remainder of this paper.

Phase One of the Project (January - June 1972)

Phase 1 of the Project consisted of a series of monthly workshops for principals and math department heads, beginning in January 1972 with a two day session, one day sessions following each month through June 1972 with an additional workshop in September 1972. The workshops focused on curriculum development and evaluation and, although embedded in the content of mathematics, were intended to promote skills applicable to other subject areas, as well. The most important objective of this phase of the Project was to generate a climate for change and pool of skills among some principals and teachers who lacked one or both. The principal or department head was considered key to building both of these features into his school. For this reason, the workshops were organized from the outset around the problem of how to develop and evaluate the math program with staff "in your school." Participants generated questions they identified as critical for them and through small group interaction with peers sought suitable answers during the course of each day's workshop. Mathematics and evaluation consultants were available to respond to questions which required special knowledge in those areas but large group presentations were kept to a minimum. This was possible, in part, because each small group of principals and department heads had at least one member who had participated in the POISE Project. These people, without being formally designated as such, served as resource

persons to each group, their effectiveness enhanced by the atmosphere of trust they enjoyed as peers within their group. Trust, along with the knowledge these people had gained from study and experience in earlier project work is the major reason why a "second generation" change strategy is considered feasible at this time. Two of the major obstacles to effective adoption--lack of trust in the change agent and lack of understanding of theinnovation--are reduced when opinion leaders within the system are identified as the agents of change by their peers. It is more likely, for example, that a principal will explain an innovation to another principal in a context which is relevant and with an information design that is meaningful than will some senior administrators and many researchers.

Each workshop ended with a short period of evaluation and suggestions to the PPDC, usually in writing, for the next workshop, as well as an assignment to be completed for the next workshop. Each assignment required the principal or department head to work with some members of his staff on a significant problem related to the evaluation and development of mathematics programs. The assignment served several purposes. First, it gave each participant good cause to begin to interact with his staff in a preliminary way to what would be necessary were major development and evaluation activities undertaken at his school. Second, the assignment was seen as the beginning of the process of training staff in the skills required for curriculum development, revision and evaluation. As well, the assignment served to provide the participant with more objective data on the problems he would encounter working with his staff in the future. This was a part of the fourth purpose for the assignment which was to serve as the core data base for small group discussion and motivation for the subsequent workshop for each participant. Lastly, the product of each

school's effort formed a pool of tentatively sequenced objectives and some items which were incorporated into the continuum of math skills described in Phase 2 of the Project. This use of each assignment made it more than a training exercise. It could legitimately be viewed by heads, principals and teachers as a significant contribution made by them to the formulation of what would eventually be a county core math program.

A relatively informal but apparently reliable formative evaluation procedure was introduced by the PPDC. Before meeting to plan each workshop, some of its members would phone 15 to 20 other principals and inquire as to difficulties encountered during the month in working on the assignment. These data (which remained anonymous) along with evaluations and suggestions from the previous workshop and the impressions of the PPDC as to needed directions, served as primary sources of the agenda for the next workshop. Indications gleaned from reviewing the assignments and talking informally with principals and math heads indicated that approximately 40 of the 46 (85%) elementary and secondary schools actively participated in the work assignment part of Phase 1.

Phase Two (July - August 1972)

By the spring of 1972 it was clear to the PPDC that the Project had assumed a scope beyond the sphere of its responsibility. At its recommendation a Mathematics Advisory Committee (MAC) was established with some overlapping membership on the PPDC and with a precisely defined set of functions designed to guide the Project through the next phases of its progress. The first function of the MAC was to review and organize the math material generated in Phase 1 and present it as resource material along with

all other available resource material, to an MAC sub-committee labelled the writing committee. The function of the writing committee was to produce a skeletal sequence of math skills and example test items from K-10 during a 5 week period in the summer of 1972 and distribute enough copies for all staff to each principal and math head by September 1972--which it did. The reasons for the skills sequence, the format in which it was developed, the type of change it represented and the use to which it was put are important features of this plan for stimulating change.

Although the PPDC originally conceived of Phase 1 as providing skills so that each school could develop and evaluate its own math program, the workshop participants made it clear that, were a more concrete alternative available, they would prefer it. Funds for a writing committee were budgeted by the County Director. The focus of the workshops then began to centre on how to contribute to what a small writing committee might do and how to prepare staffs for use and further development of the product of the writing committee's efforts. The skills sequence was to be viewed as a preliminary indication of the core (60 to 80 percent of) mathematics content for the County, prepared for reaction, modification and further development by teachers.

For these reasons, the skills sequence was distributed in a format designed to encourage such response. The format included columns of related skills, objectives, example test items, a very few materials and references arranged with large blank areas for comment on both sides of each page in the sequence. The 5 above components of the sequence were suggested headings for organizing comments to be channelled through the principal to the MAC on each category of operations (whole numbers including addition, subtraction,

multiplication, division, fractions and integers). Each set of operations was color coded for easy reference and constituted a separate sub-set of skills preceded by a short introduction of its intended use. In spite of efforts to make the format highly useable, the size of the completed document was ponderous (1-1/2 inches thick). The first task of the MAC in Phase 3, at the request of many teachers, was to prepare a brief summary of the skills in the sequence for use by staffs in determining what parts of the sequence were pertinent to them.

This sequence of skills and supporting material is the most visible product of the Project and represents the change being introduced through the Project in a very concrete way to teachers. But the change introduced through the mathematics content in the sequence is very minor indeed, most of it already very familiar to practitioners in the County. The most significant changes are in the area of process, as they contribute toward professional development, continual program revision and the increasing sophistication of a product that in the future may be an exceedingly valuable aid to instruction. These processes are, in part, implied in the product and, in part, embedded in the actions to be performed with the product in subsequent phases of the Project. The instructional model implied in the sequence, because of its focus on learner outcomes and the organization of instructional and evaluative material around those outcomes, is a significant departure from the most prevalent instructional model (which focuses on means rather than ends). The diagnostic features of such a model, for example, potentially provide some of the tools essential for systematic individualization of instruction and program evaluation, if they are adequately implemented.

Phase Three (September 1972 - June 1973)

Phase 3 is designed to stimulate implementation in the schools of all of the changes alluded to above. For the most part, process changes are encouraged by the creation of school settings in which the processes are seen as real needs to adequately manipulate the even more concrete product of Phase 2, the skills sequence. Each school staff has been encouraged to react to the skills sequence during the school year in the following way:

a) The principal or head introduces his staff to the sequence pointing out, particularly to those members not familiar with it through Phase 1, what its intended use is (a September workshop centred on how to do this);

b) The school staffs indivIdually first and then in groups select those portions pertinent to their students;

c) With this selected portion, staff groups, as they progress with their own teaching, modify the sequence by altering the sequence of skills if inappropriate, introducing missing objectives, generating more test items for each objective and suggesting materials and techniques that may be particularly suitable;

d) Staff groups organize submissions on principal's copy of continuum and send to MAC on a monthly basis.

Submissions to the MAC serve several purposes. They provide data with which to further improve the skills sequence as well as encouraging regular attention to the continuum in a way designed to build explicit understanding of the instructional model embedded therein. Submissions also serve as evidence of the degree of teacher adoption of the sequence which has occurred in schools. The MAC attempts to capitalize on these

responses, beyond improving the sequence, by sending summaries of the most immediately useful monthly submissions to all teachers in the form of a newsletter. This is intended as a schedule of short term rewards to teachers that may provide the motivation necessary to carry on a project whose major rewards are long term in nature.

Formative evaluative data on the effects of Phase 3, in addition to MAC submissions, are being collected by the MAC largely through the Trent Valley Centre. These data focus on both the program product and the implementation process. The major type of formative evaluation data, with respect to product, is the development of a small test item pool for measuring each objective in the sequence. Items for potential inclusion in the pool come from the County teachers, the MAC, the Horn item pool (1972), IPI program and other resources identified as the year progresses. These items are then, continuously throughout the year, screened for face validity and administered to a representative sample of county students. The results of this testing are used in an item analysis designed to result in a homogeneous pool of 5 to 10 test items for each objective. Teachers may then use any of these items with a higher degree of confidence in what is being measured than is the case at present. Formative evaluation data with respect to the process of implementation is being gathered through an ongoing series of interviews (begun in mid-October, 1972) with staffs selected at random. An array of 7 questions guides the interviewer in his interaction with staff for the purpose of determining what the major problems are in using the skills sequence and how the problems might best be alleviated. This information is recorded after each interview, summarized, and fed into the MAC for action at each of its monthly meetings. Complimenting this procedure with teachers, a sub-committee of the MAC is visiting groups

of principals (as part of superintendency meetings) in an effort to both determine and answer problems they may have in working with staffs on the skills sequence. A summative evaluation of the degree of implementation in Phase 3 will be carried out with school staffs during May 1973.

In summary, Phase 3 is designed to result in data useful in the production of a more complete and sophisticated core mathematics program consistent with the needs of Peterborough County as judged, in large part, by the teachers in Peterborough County. Perhaps even more important, this phase of the Project is intended to encourage a high degree of implementation of such a math program by (a) involving teachers in significant portions of program development and (b) providing teachers with the skills, support and resources to be so involved, as well as concrete guidelines to reduce their work load to a realistic level. These two features appear to represent, in the opinion of many teachers, a highly acceptable operationalization of the intent of P_1J_1 and H.S.$_1$[3]. Preliminary indications of the degree of implementation are extremely encouraging.

Phase Four (July - August 1973)

Phase 4 is, in most important respects, a repetition of Phase 2 for the purpose of producing a more sophisticated complete and useful skills sequence. The writing committee should, by this time, be able to include in the sequence the item pools, more rigorously sequenced skills and objectives and more elaboration of appropriate materials. The more

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3. These are titles of 2 Ministry of Education documents which serve as the official provincial government's position with respect to school curricula.

systematic evaluation of Phase 3 planned for May 1973 will provide additional information for the writing committee as well as summative data on the results of Phase 3.

"Objective" complexity of the program resulting from Phase 4 will significantly exceed the objective complexity of the product of Phase 2. Such increase in the complexity of an innovation, under many conditions, would suggest decreased adoption. However, Peterborough County teachers should enter Phase 5 unlike their entry into Phase 3 possessing a substantial amount of information relevant to the innovation, as a result of their Phase 3 participation. "Subjective" complexity of the revised program should be far less, for most teachers, than was the case for the original program. It is the perceived rather than absolute complexity of an innovation that influences rate and degree of adoption and diffusion. In view of the relatively high level of complexity of educational innovations, a procedure such as this, which allows for a gradual increase in complexity as clients become more sophisticated in relation to the characteristics of the innovation, seems to offer at least a theoretically promising method of increasing implementation.

Phase Five (September 1973 - June 1974)

By this phase each school in the County should have the capability to evaluate its own program in a valid and reliable manner. The same evaluative tools (criterion-referenced measures) used for such assessment offer several additional opportunities. The basic evaluative requirement for increased individualization, student diagnosis, is available through the program design. In addition, County assessment of mathematical progress

is possible in a way that avoids the limitations inherent in using standardized tests for such a purpose. Standardized tests may or may not measure the objectives of the program being evaluated. They tend in any case, to have a crystalizing effect on programs and encourage teachers to dwell on the sub-sample of objectives in their programs that correspond to the objectives measured on the test. A pool of test items available for each objective in the County math program, along with methods, such as multiple matrix sampling, may produce the following improvements:

a) Test items correspond perfectly with program objectives;

b) All program objectives are assessed making "teaching to the test" a highly desirable activity;

c) Teacher anonymity is preserved encouraging increased professional responsibility for self-evaluation;

d) Assessments of the effects of the County math program should increase in validity since there is much greater probability that what is being measured is what is being taught.

Similar methods of evaluating the process of implementation as were used in Phase 3, will be used in this phase.

Conclusion

At the time of writing (February 1973) the Project is well into Phase 3. Procedures are now being developed for an interim evaluation to be carried out at the end of Phase 3. Although there are many data of interest, those possible to collect will be the degree of adoption, student achievement, and teacher attitude. The teacher attitude and degree of adoption data are considered particularly critical in further planning for

Phases 4 and 5. Student achievement data will be collected as a basis for comparison of later program effects. Formative data collected during the present phase indicate:

1. the rate of adoption is substantially slower than originally planned;
2. teachers in the County vary widely in their opinions of the utility of the product developed so far;
3. significant numbers of teachers do find the product useful and employ it regularly in their planning;
4. the task of communicating the intent of the Project to teachers has been underestimated and not adequately done yet;
5. the principal has been overestimated as a change agent in this instance and either cannot or will not provide the staff training originally anticipated;
6. substantially more investment will be needed in directly training teachers to effectively use the product than was originally planned.

Our experience in this and earlier attempts to help introduce change in schools leads us to suspect that normative models of diffusion are logically inconsistent within the boundaries of a semi-cohesive community like a county educational jurisdiction. Such models usually suggest massive expenditures of resources on a small, initial group of innovators. As they innovate, their effects are purportedly felt like a shock wave, emanating in concentric rings from a central source and requiring less investment in unique services the farther one proceeds from the source. In many instances, however, the small, initial adoptor group is also the "high innovator" portion of the innovation's target population. Such groups are not only highly motivated intrinsically to innovate but typically receive substantial extrinsic motivation in the form of greater knowledge

input, financial support and positive reinforcement. Subsequent adopters tend to cluster closer to the "low innovator" end of the adopter continuum suggesting less intrinsic motivation to change while at the same time receiving less extrinsic motivation to change.

Strategies for change which apply diminishing forces to increasing resistance are unlikely to be successful. Strategies which keep the forces constant or even increase them may also fail, however, depending on the nature of the forces. Much of what is known regarding how to effect school change has resulted from research and development efforts which, as pointed out above, tend to focus on the high innovator. There are 2 problems related to these data. First, the data may be quite invalid even for high innovators. This possibility can be attributed to the uncontrolled nature of research on school change in concert with the probability that any "treatment" designed to stimulate adoption among high innovators would have the desired effect. It might be difficult to prevent the desired effect from occurring. Second, even assuming the validity of data related to high innovators, there is no reason to assume that it is of any value in understanding the low innovator's needs with respect to change. There is no reason to expect that applying the same forces or more of the same forces that appear to be productive with the high innovator is likely to result in adoption by the lower innovator.

We wish to briefly expand on only two of the implications of this discussion here. Strategies which are to be successful in stimulating change beyond a small proportion of the intended population must contain specific forces of varying type in accord with the characteristics of each segment of that population. Many so called diffusion strategies are in

effect non-strategies for the lower innovating portions of the population, at least in relation to the complexity characterizing most educational innovations. Both the complexity of educational innovations and the lack of visibility of benefits to the user dictate that diffusion in education must take place differently than diffusion in some other areas, like agriculture, for example. Finally, estimates of cost to implement meaningful change in schools seem to be based on the wishful thinking inherent in the diffusion models which they support. Dramatically altered costing estimates as well as ways of conducting educational R & D are in order to support such educational improvement.

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